

## CLAIMS

What is claimed is:

1. An apparatus for providing rods for use in the manufacture of smoking articles, each rod having objects individually spaced at predetermined intervals along the length thereof, the apparatus comprising:

(a) means for providing a continuous supply of rod filler material;

(b) means for continuously supplying individual objects, such means including a first rotatable member having a horizontal pan for supporting a plurality of individual objects and a plurality of stems located at predetermined intervals around the periphery of the pan, the stems having an object seat at an upper end of the stem and coupled with an actuator to rise and lower the seat from a position below the pan to a position above the pan as the horizontal pan rotates about a central axis;

(c) means for positioning the individual objects within the supply of filler material at predetermined intervals;

(d) means for forming a continuous rod having the individual objects positioned at predetermined intervals in the rod; and

(e) means for subdividing the continuous rod at predetermined intervals.

2. The apparatus of claim 1 wherein the means for providing a continuous supply of rod filler material is a means for supplying a continuous web of filter material, and

wherein the means for positioning the individual objects at predetermined intervals within the web of filter material includes a second rotatable member having a plurality of pockets positioned at predetermined intervals along a peripheral face of the second rotatable member and means within the pockets for receiving the individual objects to place the object into the web of filter material.

3. The apparatus of claim 2 further including means for assuring ejection of each individual object within the web of filter material.

4. The apparatus of claim 3 wherein the means for assuring ejection include a supply of positive pressure air connected to a passage in communication with a pocket when the pocket is at a predetermined position proximate the web of filter material.

5. The apparatus of claim 2 wherein the means for receiving the individual object is a hollow tube-shaped section positioned within the pockets and having a cylindrical-shaped side wall and a plurality of protrusions at least partly extending inwardly from the side wall, the protrusions being shaped to support the individual object.

6. The apparatus of claim 5 wherein the plurality of protrusions define a gap between the plurality of protrusions, the gap being sufficiently large to extend beyond the diameter of an object supported on the protrusions.

7. The method of claim 2 further comprising means for controlling the rate of rotation of the first rotatable member and the second rotatable member such that movement of a stem is synchronized with the movement of the pocket to permit transfer of an object from a stem to a pocket.

8. The apparatus of claim 1 wherein the means for supplying the individual objects further comprises a transfer tube having an inlet for the object above the pan and an outlet for the object below the pan.

9. The apparatus of claim 8 wherein the means for positioning the individual object includes a plow positioned proximate the filler material and having a port in communication with the outlet of the transfer tube.

10. The apparatus of claim 1 wherein the means for subdividing the continuous rod includes an object detection means for transmitting a signal representative of a location of an object within the rod to adjust the location where the rod is subdivided relative the object.

11. An apparatus for providing rods for use in the manufacture of smoking articles, each rod having objects individually spaced at predetermined intervals along the length thereof, the apparatus comprising:

a rotatable member including a pan having a plurality of holes formed in the pan at predetermined intervals around the periphery of the pan, a skirt depending from the perimeter of the pan defining a plurality of guides in the skirt, and a plurality of stem lifters each comprising a hollow tube slidingly received within a hole, a cam block coupled at a predetermined position on the tube and slidingly received within the guide, and a cam follower coupled to the cam block; and

a cam drum in a position fixed relative the first rotatable member, the cam drum having a side wall received within and juxtaposed the skirt, the side wall having a cam channel defined therein circumscribing a continuous undulating path around the perimeter of the cam drum;

wherein the cam follower of each stem lifter is received within the cam channel; whereupon rotation of the rotatable member; the cam follower moves along the path described by the cam channel whereby the stem lifters rise and fall at a rotational position determined by the cam channel.

12. The apparatus of claim 11 wherein the cam drum further includes a vacuum channel circumscribed around a portion of the side wall at a predetermined height and an air supply port in the side wall at the same predetermined height as the vacuum channel, and the skirt further includes a plurality of passages, each passage at a first end being in communication with the tube of the stem lifter and at a second end being positioned relative the cam drum to be at the predetermined height to be in communication with the vacuum channel or the air supply port when the passage rotates over the same.

13. The apparatus of claim 12 wherein the air supply port is located at a rotational position where a maximum height of the cam channel is located.

14. The apparatus of claim 11 wherein the rotatable member further includes a retaining wall extending above the pan and positioned around the perimeter of the pan.

15. The apparatus of claim 11 wherein the pan further includes a top surface having a plurality of radially extending troughs, each of said holes being located within a trough.

16. The apparatus of claim 11 wherein each tube of the stem lifters has a top end terminating with an object seat for supporting an object thereon; the top end further having slots in the seat to permit air flow around an object supported on the seat and into the tube.

17. The apparatus of claim 11 further comprising a transfer tube in a position fixed relative the rotatable member, the transfer tube having an inlet positioned over a path traveled by the stem lifters and an outlet below the pan in communication with a plow proximate to filler material to be formed to deposit the objects therein.

18. The apparatus of claim 11 wherein the rotatable member further comprises a plurality of transfer tubes positioned around the perimeter of the pan.

19. The apparatus of claim 18 wherein each transfer tube includes an inlet positioned over one of the stem lifters and an outlet positioned below the pan.

20. The apparatus of claim 18 wherein each transfer tube is integrated with the stem lifter.

21. The apparatus of claim 18 further comprising a rotatable insertion wheel having a central orifice and a peripheral face with a plurality of equally spaced passages in communication with the peripheral face and the central orifice, each passage having a seat for supporting an object within the passage proximate the peripheral face, the seat having gaps defined therein to permit flow of air through the passage and past an object supported on the seat;

wherein the rotatable insertion wheel is positioned relative the rotatable member such that the peripheral face of the insertion wheel at a maximum height is positioned at a height below the outlet of a transfer tube such that upon synchronized rotation of the insertion wheel and rotatable member, the outlet of a transfer tubes

moves into communication with a passage in the peripheral face of the insertion wheel.

22. The apparatus of claim 11 further comprising a plurality of ejector pins each disposed over and axially aligned with a stem lifter.

23. An apparatus for providing rods for use in the manufacture of smoking articles, each rod having objects individually spaced at predetermined intervals along the length thereof, the apparatus comprising:

a hopper for receiving a supply of a plurality of objects;

a rotatable insertion wheel having a central orifice and a peripheral face with a plurality of equally spaced passages in communication with the peripheral face and the central orifice, each passage having a seat for supporting an object within the passage proximate the peripheral face, the seat having gaps defined therein to permit flow of air through the passage and past an object supported on the seat, the insertion wheel further comprising a bearing housing received within the central orifice of the wheel, the bearing housing having a vacuum port and an air supply port each in communication with a path of travel of the passage openings in the central orifice about the bearing housing;

wherein at a first position of rotation around the perimeter of the insertion wheel, a passage in the peripheral face of the wheel is positioned proximate the hopper and in communication with the vacuum port, and at a second position of rotation around the perimeter of the insertion wheel a passage in the peripheral face is positioned proximate the rod to be formed and in communication with the air supply port.

24. The apparatus of claim 23 wherein the hopper comprises a chute proximate the insertion wheel.

25. The apparatus of claim 24 wherein the peripheral face of the insertion wheel at the first position is within an interior portion of the hopper where the plurality of objects is received.

26. The apparatus of claim 23 wherein the hopper comprises a pan rotatable in a horizontal plane, the pan having a plurality of transfer tubes extending from the pan to a height proximate a height of the peripheral face of the insertion wheel at the first position of rotation, wherein one of the transfer tubes is in communication with the passage of the insertion wheel.

27. A process for manufacturing rods for use in the manufacture of smoking articles, each rod having objects individually spaced at predetermined intervals along the length thereof, the process comprising:

- (a) continuously supplying rod filler material;
- (b) continuously supplying individual objects by supporting a plurality of objects on a horizontal pan, rotating the pan to cause a plurality of stems received within holes in the pan to rise above the pan to lift an object seated on the stem, and positioning the object within the supplied filler material;
- (c) forming a continuous rod having the individual objects positioned at predetermined intervals within the rod; and
- (d) subdividing the continuous rod at predetermined intervals.

28. The process of claim 27 whereby a continuous web of filter material is supplied as rod filler material, and wherein the positioning of the individual objects comprises continuously inserting the objects at predetermined intervals within the supplied web of filter material.

29. The process of claim 28 wherein the continuously inserting comprises transferring the objects from the stem to a first position on a vertical rotating member and rotating the object from the first position to a second position within the web of filter material.

30. The process of claim 29 further comprising applying a vacuum to retain the object on the vertical rotating member at the first position and applying a positive pressure air supply to the object to eject the object from the vertical rotating member at the second position.

31. The process of claim 29 further comprising synchronizing the rotations of the horizontal pan and the vertical rotating member such that a transfer tube on the horizontal pan aligns in communication with a pocket on the vertical rotating member when the object is transferred to the rotating vertical member.

32. The process of claim 28 further comprising visually detecting the objects within the continuous rod and sending a signal indicative thereof to synchronize the subdividing of the rod at a location to space the objects relative the location of subdivision.

33. A process for manufacturing rods for use in the manufacture of smoking articles, each rod having objects individually spaced at predetermined intervals along the length thereof, the process comprising:

- supplying a continuous web of filter material from a source of filter material;

- providing a supply of a plurality of objects into a hopper;

- rotating a vertically oriented wheel having a plurality of pockets within a peripheral face, wherein a portion of the peripheral face moves past a first location proximate the hopper;

- continuously introducing the objects into successive pockets along the peripheral face of the rotating wheel;

- maintaining each object in each pocket by applying a vacuum to the pocket when the pocket moves past the first position;

- inserting at predetermined intervals the individual objects from within each successive pocket to within the web of filter material by applying a supply of positive pressurized gas to the pocket;

- receiving the web of filter material having the individual objects positioned at predetermined intervals therein into a rod making means and making a continuous rod therefrom; and

- subdividing the continuous rod at predetermined intervals into the desired length thereby forming filter rods such that the desired number of individual objects are positioned at the desired positions within the filter rods.

34. The process of claim 33 wherein the continuously introducing comprises rotating the peripheral face of the wheel into the hopper containing the individual objects;

35. The process of claim 33 wherein the continuously introducing comprises transferring an individual object from the hopper to the first location through a transfer tube.